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**CLAIMS**

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[Claim(s)]

[Claim 1]

It is an air bag. This air bag is equipped with the 2nd metal layer put on the 1st metal layer and this 1st metal layer. One [ at least ] layer of these layers It is plastically deformable, and the periphery of two or more of said layers is joined mutually, the chamber of a gas tight is made substantially, and a generation-of-gas means and a means to drive this generation-of-gas means are built in in this chamber.

[Claim 2]

Said 1st chamber is an air bag by claim 1 which is the thing of a gas tight substantially.

[Claim 3]

Both of said layer are the air bags by claim 1 or claim 2 which is plastically deformable.

[Claim 4]

Said generation-of-gas means is an air bag by any one of said the claims by which said two layers are held by the field of said two layers each other joined.

[Claim 5]

Said generation-of-gas means is an air bag by claim 4 currently held in said 1st chamber and the chamber of that open for free passage.

[Claim 6]

A means for said generation-of-gas means to be equipped with a powder means, and to operate this generation-of-gas means is an air bag by any one of said the claims equipped with a means to light said powder means.

[Claim 7]

Said powder means is an air bag by claim 6 equipped with the ignition implement which answers and lights an electrical signal, and the inflator which operates according to actuation of this ignition implement.

[Claim 8]

Said ignition implement is an air bag by claim 7 which is making explosives build in housing formed with the plastics material.

[Claim 9]

Said inflator is an air bag by claim 7 or claim 8 which is making explosives build in housing of a plastics material.

[Claim 10]

Said ignition implement and inflator are an air bag by any one of claim 7 located in the adjacent crevice constituted by said 1st metal layer and the 2nd metal layer to the claims 9 by which the path which makes these crevices open for free passage is prepared between these two crevices.

[Claim 11]

Said powder means is an air bag by any one of claim 6 to the claims 10 which are open for free passage with said 1st chamber with one or more passage of the restricted dimension.

[Claim 12]

Said 1st chamber is an air bag by any one of said the claims divided into the cel which is mutually [ plurality ] open for free passage with two or more fields where said 1st layer has fixed said 2nd layer.

[Claim 13]

The air bag by either claim 4 by which said 1st layer is welded to said 2nd layer in the field which said 1st layer has fixed in said 2nd layer or the claim of subordination in this and claim 12.

[Claim 14]

The air bag by any one of said the claims from which the seal of a periphery is constituted by periphery welding.

[Claim 15]

The air bag which was fundamentally explained in relation to the accompanying drawing, and was illustrated.

[Claim 16]

The new description of a publication or the description should put here together.

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[Translation done.]

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

This invention relates to an air bag and the air bag especially used for a car like an automobile.

**[0002]**

Attaching an air bag in a car with a motor like [ until now ] an automobile is proposed, and such an air bag expands at the time of the occurrence of accident.

**[0003]**

The common air bag is made from textiles like the woven polyamide material, and an air bag answers the signal which senses an impact and an accident condition, and expands very quickly.

**[0004]**

Generally, the above air bags are stored in the steering wheel or the dashboard, and when an anterior part impact occurs, they take care of the crew of an automobile. It is begun almost immediately for such an air bag to expand comparatively quickly, and to contract it so that the duty of a software cushion may be achieved. When the crew of an automobile is bent forward in the case of an anterior part impact, a software cushion decelerates crew and it is made not to wound crew.

**[0005]**

The air bag of a type which was described above usually expands with 50 or less milliseconds' speed, and is actually contracted by after [ impact sensing ] 200 millisecond. Therefore, when a such type air bag is desirable in case of a rollover accident, or continuing at the first impact and getting the 2nd impact, a protective action which is desirable cannot be achieved.

**[0006]**

Use of the air bag of the metal which has a gas generator separately is proposed (WO 96/22199). The air bag of the metal described here has complicated structure, and it cannot manufacture it easily.

**[0007]**

This invention tends to offer the improved air bag structure.

**[0008]**

According to this invention, one certain air bag is offered. This air bag is equipped with the 2nd metal layer put on the 1st metal layer and this 1st metal layer. One [ at least ] layer of these layers It is plastically deformable, and the periphery of two or more of said layers is joined mutually, MBA of a gas tight is made substantially, and a generation-of-gas means and a means to drive this generation-of-gas means are built in in this chamber.

**[0009]**

Plastics coating of said metal could be carried out with some another means, and it could be laminated.

**[0010]**

Said metal layer has very low permeability. When it expands, this air bag remains expanding over comparatively long time amount, and can perform the expected protective action. Metaled use is equal to corrosion again, and has an advantage with abrasion resistance.

**[0011]**

Preferably, said 1st chamber is the thing of a gas tight (gas is not revealed) substantially.

**[0012]**

The plastically deformable thing of the two above-mentioned layers is advantageous.

**[0013]**

Preferably, as for said generation-of-gas means, it is desirable that said two layers are held by the field of said two layers each other joined.

**[0014]**

As for said generation-of-gas means, it is advantageous to be held in said 1st chamber and each chamber open for free passage.

**[0015]**

Practical, said generation-of-gas means was equipped with the powder means, and a means to operate this generation-of-gas means is equipped with a means to light said powder means.

**[0016]**

Preferably, said powder means is equipped with the ignition implement which answers and lights an electrical signal, and the inflator which operates according to actuation of this ignition implement.

**[0017]**

As for said ignition implement, it is advantageous to make explosives build in housing formed with the plastics material.

**[0018]**

Said inflator makes explosives build in housing of a plastics material practical.

[0019]

Preferably, said ignition implement and inflator are located in the adjacent crevice constituted by said 1st metal layer and the 2nd metal layer, and the path which makes these crevices open for free passage is prepared between these two crevices.

[0020]

As for said powder means, it is advantageous that it is open for free passage with the crevice of said chamber with one or more passage of the restricted dimension.

[0021]

Said chamber is divided into two or more cels which the interior opens for free passage mutually by two or more fields which said 1st layer has fixed in said 2nd layer practical.

[0022]

Preferably, in the field which said 1st layer has fixed in said 2nd layer, said 1st layer is welded to said 2nd layer.

[0023]

As for the seal part of said periphery, it is advantageous that the periphery is welded and constituted.

[0024]

An example explains referring to the drawing of attachment of this invention here so that he can understand this invention still better, and so that the further description of that may be known.

[0025]

When drawing 1 of an attached drawing is referred to first, the rectangular metal sheet 1 is illustrated substantially and it is made for this sheet to have an air bag formed in two or more fields 2 which are welded to the other party sheet of another side, or fix by others of this invention to which the shadow slash was attached.

[0026]

The aforementioned metal sheet is the thing of thickness this metal sheet is plastically deformable.

[0027]

Said two or more fields 2 where said sheet should be welded to an other party sheet include the periphery field which surrounds the whole outside of said sheet substantially in addition to field 4 [ small ] of said sheet located in the center of a flank on the other hand. The field 4 is dented slightly and suits the location of the large crevice 5 close to the edge of said sheet. This crevice 5 is divided into the sheet which said sheet piles up in joining or the fields 6 and 7 which are connected. Said fields 6 and 7 are divided by another path 8, and are detached, and the path 4 and location which this path 8 has in the opposite side of said crevice 5 face each other. Said path 8 leads to another crevice 9. This crevice 9 is divided by the field 10 which surrounds this crevice substantially. The two fracture sections or paths 11 and 12 are established in this field 10. These paths 11 and 12 are making said crevice 9 and two cels 13 and 14 open for free passage, these cels are classified by the field 15 where plurality aligned, and these fields are parts joined to the sheet which the sheet 1 of illustration piles up. Said two or more fields 15 cross a sheet 1 in the state of three parallel lines, and are divided by two or more gaps 16 in these fields. Two cels 17 and 18 other than said cels 13 and 14 are added by these fields 15 and the gap 16, and said all cels 13, 14, 17, and 18 open each other for free passage through said gap 16, respectively.

[0028]

If drawing 2 of an attached drawing is referred to here, the sheet 1 is illustrated again. The ignition implement 20 is illustrated. This ignition implement 20 has a plug 21, and this plug is formed in the end section of the housing 22 of a cylindrical shape. A plug 21 is arranged at a path 4 and housing 22 is arranged in said crevice 5. Housing 22 is formed with the plastics material. Housing 22 is loaded with the powder. The electric wiring 23 of a pair has reached the squib in housing 22 through said plug.

[0029]

The inflator (expansion implement which carries out gassiness tension) 24 is illustrated. This inflator 24 is equipped with housing of the cylindrical shape made from a plastics material, and the suitable powder thing is built in this housing. The inflator 24 is arranged in the crevice 9.

[0030]

Drawing 3 shows completed ABAGGU by this invention. The 2nd sheet 30 which is the same as the sheet of drawing 1 is piled up upwards, although the sheet 1 as shown in drawing 2, the ignition implement 20, and the inflator 24 are put together. The sheet 1 and the sheet 30 have fixed with welding or a special means mutually in two or more fields 2 of all of a shadow slash, as explained in relation to the above and drawing 1. The field 3 of a periphery has fixed to the plug 21 of the ignition implement 20, and the field 3 of a periphery forms the seal of a gas tight substantially by this. The completed air bag is equipped with the chamber of the 1st or the Lord who has two or more cels 13, 14, 17, and 18, and this chamber is open for free passage with the 2nd chamber constituted by said crevice 9, and is held by the field of the metal sheets 1 and 30 with which the powder material of each other was welded in said crevice.

[0031]

The diameter of the ignition implement 20 is thinner than an inflator 24 so that drawing 3 may show.

[0032]

As described above, an air bag is mounted in an automatic in the car one, and is related to the sensor which senses an accident condition. An electrical signal is sent through wiring 23 from this sensor, and the ignition implement 20 is operated. The powder material of built-in in the ignition implement 20 is lit in this way. Hot gas flows the path 8 between a crevice 5 and a crevice 9. The explosives of loading light an inflator 24 by this hot gas. Hot gas occurs by the loading powder in an inflator 24, and this hot gas flows paths 11 and 12 from a crevice 9, and is supplied to cels 13 and 14 and cels 17 and 18.

[0033]

While the loading powder material in an inflator 24 continues burning, the internal pressure of a crevice 9 is fully

maintained, and paths 11 and 12 have a dimension in which a powder finishes burning effectively.

[0034]

Cels 13, 14, 17, and 18 expand, and as shown in drawing 4, they become the gestalt of a cylindrical shape substantially. said two or more cels expand — be alike and hang — sheets 1 and 30 — each deforms plastically. The 1st chamber constituted by cels 13, 14, and 17.18 is a gas tight substantially, the products of combustion of the explosives with which the ignition implement 20 and the inflator 24 are loaded is suspended in the chamber constituted with said air bag, and heat of combustion is also further held in said air bag at the beginning at least. An air bag becomes easy to swell by this completely. Since the generation-of-gas means constituted by said ignition implement and inflator is established in said chamber divided in said air bag, the duct which it is not necessary to prepare [ duct ] housing of a gas generator separately and, and makes an air bag open gas generator housing for free passage is also unnecessary. However, the gas drainage means (vent) which can miss gas to some extent can be formed in said air bag. The seal of this gas drainage means is carried out with the foil or a plug, and when a pressure exceeds a predetermined threshold in an air bag, it comes to open it automatically.

[0035]

The above-mentioned air bag is the thing of an automobile with which various locations can be equipped variously. For example, said air bag is attached in a side door for the protection at the time of a side-face opposition outbreak student, or can protect knee and membrum-inferius part of those who attached in the dashboard bottom and have sat down to an automatic in the car one. The aforementioned air bag swells comparatively for a short time as compared with the expansion time amount of the bag of the textiles proposed at least until now, and continues swelling over comparatively long time amount. By the aforementioned metal being opaque, since permeability is very low, gas stops in said bag and maintains the swelling of said bag. In this way, case [ like a rollover accident ], as for the explained air bag, a protective action with high effectiveness is achieved. Said air bag is metal, and since this metal deforms plastically at the time of expansion, a gas drainage means is opened wide, and even if the pneumatic pressure in said air bag falls to an atmospheric pressure, said air bag maintains the gestalt "swollen."

[0036]

By metaled use, said air bag fits especially use in the environment where become a thing suitable for especially use in the location which is easy to wear out, and textiles deteriorate, if this metal is a corrosion resistance thing.

[0037]

It means "it including or changing" in this specification, and means "it including or changing". [ "which it has" ] [ "which it has" ]

[0038]

It is expressed by the aforementioned explanation with the description of a publication, or a specific gestalt, and the approach or the process of attaining the following claims in a means to achieve the function of a publication, an attached drawing, or the indicated result can be appropriately used with various gestalten combining these descriptions for invention implementation separately.

[Brief Description of the Drawings]

[Drawing 1] It is the top view of the air bag in the condition by this invention of not expanding.

[Drawing 2] It is the partial schematic drawing corresponding to drawing 1 of the air bag in the condition of not expanding.

[Drawing 3] It is the air bag side elevation of drawing 1 in the condition of not expanding, and drawing 2.

[Drawing 4] It is the cross-section schematic drawing in the condition that the air bag shown in drawing 3 from drawing 1 is expanding.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is the top view of the air bag in the condition by this invention of not expanding.

[Drawing 2] It is the partial schematic drawing corresponding to drawing 1 of the air bag in the condition of not expanding.

[Drawing 3] It is the air bag side elevation of drawing 1 in the condition of not expanding, and drawing 2.

[Drawing 4] It is the cross-section schematic drawing in the condition that the air bag shown in drawing 3 from drawing 1 is expanding.

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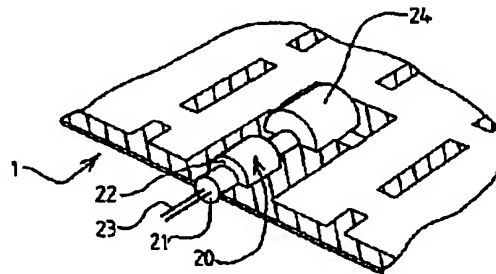
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(54) 【発明の名称】 金属エアークラップ

## (57) 【要約】

第1の金属層(1)と第2の金属層(30)とから作られているエアークラップ。これら層の少なくとも一つが可塑的に変形可能になっている。これらの層には、これらの層を互いにシールして、一つのチャンバを構成する周縁のシール(2, 3)が設けられている。ガス発生器のようなガス発生手段が前記チャンバ内に配置してある。



**【特許請求の範囲】****【請求項 1】**

エアバッグであって、このエアバッグは、第1の金属層と、この第1の金属層に重ね合わされた第2の金属層を備え、これら層の少なくとも一方の層は、可塑的に変形可能なもので、前記複数の層の周縁は、互いに接合されていて、実質的にガスタイトのチャンバが作られていて、このチャンバ内にガス発生手段とこのガス発生手段を駆動する手段とが内蔵されるようになっているもの。

**【請求項 2】**

前記第1のチャンバは、実質的にガスタイトのものである請求項1によるエアバッグ。

**【請求項 3】**

前記層の両者は可塑的に変形可能なものである請求項1又は請求項2によるエアバッグ。

**【請求項 4】**

前記ガス発生手段は、前記二つの層が互いに接合されている前記二つの層の領域により保持されている前記請求項のいずれか一つによるエアバッグ。

**【請求項 5】**

前記ガス発生手段は、前記第1のチャンバと連通するそのチャンバ内に保持されている請求項4によるエアバッグ。

**【請求項 6】**

前記ガス発生手段は、火薬手段を備え、このガス発生手段を作動する手段は、前記火薬手段を点火する手段を備えている前記請求項のいずれか一つによるエアバッグ。

**【請求項 7】**

前記火薬手段は、電気信号に応答して点火する点火具と、この点火具の作動に応じて作動するインフレータとを備える請求項6によるエアバッグ。

**【請求項 8】**

前記点火具は、プラスチック材料で形成されたハウジングに火薬類を内蔵させている請求項7によるエアバッグ。

**【請求項 9】**

前記インフレータは、プラスチック材料のハウジングに火薬類を内蔵させている請求項7又は請求項8によるエアバッグ。

**【請求項 10】**

前記点火具とインフレータとは、前記第1の金属層と第2の金属層により構成された隣り合う凹部内に位置し、これら二つの凹部の間にこれら凹部を連通させる通路が設けられている請求項7から請求項9のいずれか一つによるエアバッグ。

**【請求項 11】**

前記火薬手段は、制限された寸法の一つ又は複数の流路により前記第1のチャンバと連通している請求項6から請求項10のいずれか一つによるエアバッグ。

**【請求項 12】**

前記第1のチャンバは、前記第1の層が前記第2の層の固着されている複数の領域により複数の互いに連通しているセルに分けられている前記請求項のいずれか一つによるエアバッグ。

**【請求項 13】**

前記第1の層が前記第2の層に固着されている領域においては、前記第1の層が前記第2の層に溶接されている請求項4又はこれに従属の請求項のいずれか又は請求項12によるエアバッグ。

**【請求項 14】**

周縁のシールが周縁溶接により構成されている前記請求項のいずれか一つによるエアバッグ。

**【請求項 15】**

基本的に添付図面に関連して説明され、図示されたエアバッグ。

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**【請求項 16】**

ここに記載の新規な特徴又は特徴の組み合わせ。

**【発明の詳細な説明】****【0001】**

この発明は、エアバッグ、特に、自動車のような車両に使用するエアバッグに関するものである。

**【0002】**

これまで自動車のようなモーター付き車両にエアバッグを取り付けることが提案されており、このようなエアバッグは、事故発生時に膨張するようになっている。

**【0003】**

一般的なエアバッグは、織成されたポリアミドマテリアルのような織物から作られており、エアバッグは、衝撃や事故状態を感知する信号に応答して極めて素早く膨張するようになっている。

**【0004】**

一般的にあって、前記のようなエアバッグは、ステアリングホイールやダッシュボード内に格納されていて、前部衝撃が発生したとき自動車の乗員を保護するようになっている。このようなエアバッグは、比較的素早く膨張し、ソフトクッションの役目を果たすようにほぼ直ちに収縮しはじめる。前部衝撃の際に自動車の乗員が前倒しされるとき、ソフトクッションが乗員を減速させ、乗員を傷つけないようにする。

**【0005】**

上記したようなタイプのエアバッグは、通常50ミリセカンド以下の速さで膨張し、衝撃感知後200ミリセカンドで実際に収縮する。したがって、このようなタイプのエアバッグは、転覆事故の場合に望ましかったり、最初の衝撃に引き続いて第2の衝撃を受けるような場合に望ましいような保護作用を果たすことができない。

**【0006】**

別個にガス発生器をもつ金属のエアバッグの使用が提案されている(WO 96/22199)。ここに述べた金属のエアバッグは、構造が複雑で、製造し難い。

**【0007】**

この発明は、改良されたエアバッグ構造を提供しようとするものである。

**【0008】**

この発明によれば、ある一つのエアバッグが提供されるものであって、このエアバッグは、第1の金属層と、この第1の金属層に重ね合わされた第2の金属層を備え、これら層の少なくとも一方の層は、可塑的に変形可能なもので、前記複数の層の周縁は、互いに接合されていて、実質的にガスタイトのンバが作られていて、このチャンバ内にガス発生手段とこのガス発生手段を駆動する手段とが内蔵されるようになっている。

**【0009】**

前記金属は、別のいくつかの手段でプラスチックコーティングされたり、ラミネートされたものでもよい。

**【0010】**

前記金属層は、透過性が極めて低い。このエアバッグは、膨張したとき、比較的長い時間にわたって膨張したままになっていて、期待した保護作用を営むことができる。金属の使用は、また腐食に耐え、耐摩耗性をもつ利点がある。

**【0011】**

好ましくは、前記第1のチャンバは、実質的にガスタイト（ガスが漏洩しない）のものである。

**【0012】**

上記の二つの層は、可塑的に変形可能であることが有利である。

**【0013】**

好ましくは、前記ガス発生手段は、前記二つの層が互いに接合されている前記二つの層の領域により保持されていることが好ましい。



## 【0014】

前記ガス発生手段は前記第1のチャンバと連通するそれぞれのチャンバ内に保持されていることが有利である。

## 【0015】

実用的には、前記ガス発生手段は、火薬手段を備え、このガス発生手段を作動する手段は、前記火薬手段を点火する手段を備えている。

## 【0016】

好ましくは、前記火薬手段は、電気信号に応答して点火する点火具と、この点火具の作動に応じて作動するインフレータとを備える。

## 【0017】

前記点火具は、プラスチック材料で形成されたハウジングに火薬類を内蔵させることが有利である。

## 【0018】

実用的には、前記インフレータは、プラスチック材料のハウジングに火薬類を内蔵させる。

## 【0019】

好ましくは、前記点火具とインフレータとは、前記第1の金属層と第2の金属層により構成された隣り合う凹部内に位置し、これら二つの凹部の間にこれら凹部を連通させる通路が設けられている。

## 【0020】

前記火薬手段は、制限された寸法の一つ又は複数の流路により前記チャンバの凹部と連通していることが有利である。

## 【0021】

実用的には、前記チャンバは、前記第1の層が前記第2の層に固着されている複数の領域により内部が連通し合っている複数のセルに分けられている。

## 【0022】

好ましくは、前記第1の層が前記第2の層に固着されている領域においては、前記第1の層は、前記第2の層に溶接されている。

## 【0023】

前記周縁のシール部分は、周縁が溶接されて構成されていることが有利である。

## 【0024】

この発明をさらによく理解できるように、そして、そのさらなる特徴が分かるように、ここにこの発明を添付の図面を参照しながら実施例により説明する。

## 【0025】

添付の図面の図1を最初に参照すると、実質的に方形の金属シート1が図示されており、このシートは、他方の相手方シートに溶接されるか、または、その他で固着される複数の領域2に影斜線がつけられた、この発明によりエアバッグを形成するようにされるものである。

## 【0026】

前記の金属シートは、該金属シートが可塑的に変形可能であるような厚みのものである。

## 【0027】

前記シートが相手方シートに溶接されるべき前記複数の領域2は、前記シートの一方側部中央に位置する小さな領域4以外において前記シートの外側全体を実質的に囲む周縁領域を含む。領域4は、僅かに凹んでおり、前記シートのエッジに近接している広い凹部5の位置に合っている。この凹部5は、前記シートが重ね合わされるシートに溶着または接続される領域6、7で仕切られている。前記領域6、7は、別の通路8により分け離されており、この通路8は、前記凹部5の向かい側にある通路4と位置が向かいあっている。前記通路8は、別の凹部9に通じている。この凹部9は、この凹部を実質的に囲む領域10により仕切られている。この領域10には、二つの破断部又は通路11、12が設けられている。これらの通路11、12は、前記凹部9と二つのセル13、14とを連通させて

おり、これらのセルは、複数の整列された領域 15 により分けられており、これら領域は、図示のシート 1 が重ね合わされるシートに接合される部分である。前記複数の領域 15 は、3 本の平行線の状態でシート 1 を横切り、これら領域には、複数の間隙 16 により分断されている。これら領域 15 と間隙 16 とにより前記セル 13, 14 のほかに二つのセル 17, 18 が追加され、前記セル 13, 14, 17, 18 のすべては、前記間隙 16 を介してそれぞれ互いに連通し合っている。

#### 【0028】

添付の図面の図 2 をここで参照すると、シート 1 が再び図示されている。点火具 20 が図示されている。この点火具 20 は、プラグ 21 を有し、このプラグは、円筒形のハウジング 22 の一端部に形成されている。プラグ 21 は、通路 4 に配置され、ハウジング 22 は、前記凹部 5 に配置されている。ハウジング 22 は、プラスチック素材により形成されている。ハウジング 22 には、火薬が装填されている。一对の電気配線 23 が前記プラグを経てハウジング 22 内の導火爆管に達している。

#### 【0029】

インフレーター（ガス膨張させる膨張具）24 が図示されている。このインフレーター 24 は、プラスチック素材で作られる円筒形のハウジングを備え、このハウジングには、適当な火薬ものが内蔵されている。インフレーター 24 は、凹部 9 に配置されている。

#### 【0030】

図 3 は、この発明による完成されたエアバッグを示す。図 1 のシートと同じものである第 2 のシート 30 は、図 2 に示されているようなシート 1、点火具 20 及びインフレーター 24 が組み合わされているものの上に重ね合わされている。シート 1 とシート 30 とは、上記そして図 1 に関連して説明したように影斜線の複数の領域 2 のすべてにおいて互いに溶接又は別途手段で固着されている。周縁の領域 3 は、点火具 20 のプラグ 21 に固着されていて、これによって周縁の領域 3 は、実質的にガスタイトのシールを形成する。完成されたエアバッグは、複数のセル 13, 14, 17, 18 を有する第 1 の又は主のチャンバを備え、このチャンバは、前記凹部 9 により構成されている第 2 のチャンバと連通しており、前記凹部においては、火薬マテリアルが互いに溶接された金属シート 1, 30 の領域により保持されている。

#### 【0031】

図 3 から分かるように、点火具 20 の直径は、インフレーター 24 よりも細い。

#### 【0032】

上記したように、エアバッグは、自動車内に実装され、事故状態を感知するセンサに関連させるようになっている。このセンサから配線 23 を経て電気信号が発信され、点火具 20 を作動させる。かくして点火具 20 に内蔵の火薬マテリアルが着火する。凹部 5 と凹部 9 との間の通路 8 をホットなガスが流れる。このホットなガスでインフレーター 24 に装填の火薬類が着火する。インフレーター 24 内の装填火薬によりホットなガスが発生し、このホットなガスは、凹部 9 から通路 11, 12 を流れて、セル 13, 14 へ、そして、セル 17, 18 へと供給される。

#### 【0033】

通路 11, 12 は、インフレーター 24 内の装填火薬マテリアルが燃え続ける間凹部 9 の内圧が十分に保たれて、火薬が効果的に燃焼し終えるような寸法になっている。

#### 【0034】

セル 13, 14, 17, 18 は、膨張して、図 4 に示すように実質的に円筒形の形態になる。前記複数のセルが膨張するにつれ、シート 1, 30 それぞれは、可塑的に変形する。セル 13, 14, 17, 18 により構成される第 1 のチャンバは、実質的にガスタイトであり、点火具 20 とインフレーター 24 に装填されている火薬類の燃焼生成物は、前記エアバッグにより構成されるチャンバ内に保留され、さらに、燃焼熱もまた少なくとも当初には前記エアバッグ内に保持される。これによって、エアバッグが完全に膨らみやすくなる。前記点火具とインフレーターとにより構成されるガス発生手段が前記エアバッグ内に区画された前記チャンバ内に設けられているから、ガス発生器のハウジングを別途に

設ける必要がなく、また、ガス発生器ハウジングをエアバッグに連通させるダクトも不要である。しかしながら、前記エアバッグには、ガスがある程度逃がすことができるガス抜き手段（ベント）を設けることができる。このガス抜き手段は、例えば、フォイルまたは栓でシールし、エアバッグ内に圧力が所定のスレショールドを越えたとき自動的に開くようになるものである。

【0035】

上記したエアバッグは、自動車の種々色々な位置に装着できるものである。例えば、前記エアバッグは、側面衝突発生時の保護のためにサイドドアに取り付けたり、ダッシュボードの下側に取り付けて自動車内に着座している人の膝や下肢部分を保護するようにすることができる。前記のエアバッグは、少なくともこれまで提案されている織物のバッグの膨張時間に比較すると、比較的短時間で膨らみ、比較的長い時間にわたり膨らみ続ける。前記の金属は、透過性がないかまたは極めて透過性が低いものであるから、ガスは、前記バッグ内に留まり、前記バッグの膨みを保つようにする。説明したエアバッグは、かくして、例えば転覆事故のような場合効果が高い保護作用を果たす。前記エアバッグは、金属製であり、この金属は、膨張時可塑的に変形するものであるから、ガス抜き手段が開放され、前記エアバッグ内の空気圧が大気圧まで低下しても前記エアバッグは、“膨らまされた”形態を保つ。

【0036】

金属の使用により、前記エアバッグは、該金属が耐食性のものであれば、摩耗しやすい場所での使用に特に適するものとなり、また、織物が劣化する環境での使用に特に適するものとなる。

【0037】

この明細書において、“備える”は、“含む又は成る”を意味し、“備えている”は、“含む又は成る”を意味する。

【0038】

前記の説明に記載の特徴、又は特定の形態で表現され、記載の機能を果たす手段での以下の請求の範囲、又は添付の図面、又は記載された結果を達成する方法又はプロセスは、適切に別個に又はそれら特徴を組み合わせて多様な形態で発明実現のために利用できるものである。

【図面の簡単な説明】

【図1】 この発明による膨張していない状態におけるエアバッグの平面図である。

【図2】 膨張していない状態のエアバッグの図1に対応する部分略図である。

【図3】 膨張していない状態の図1と図2のエアバッグ側面図である。

【図4】 図1から図3に示したエアバッグの膨張している状態における断面略図である。

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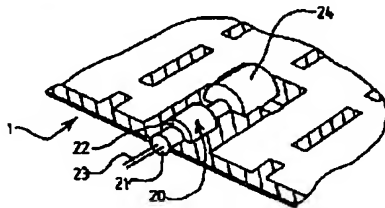
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(52) Int. Cl. (2001): B60R 21/14  
(54) Title: MOTOR AIR-BAG  
(57) Abstract: An air-bag is made from a first metal layer (1) and a second metal layer (2). At least one of these layers is plastically deformable. The layers are provided with a perforated seal (21, 22) sealing the layers together to define a chamber. There are gas generating means, such as a gas generator, located within the chamber.



(54) Title: MOTOR AIR-BAG



(57) Abstract: An air-bag is made from a first metal layer (1) and a second metal layer (2). At least one of these layers is plastically deformable. The layers are provided with a perforated seal (21, 22) sealing the layers together to define a chamber. There are gas generating means, such as a gas generator, located within the chamber.

WO 01/45986 A1

WO 01/45046

PCT/SE00/02024

**METAL AIR-BAG**

THE PRESENT INVENTION relates to an air-bag and more particularly relates to an air-bag intended for use in a vehicle such as a motor car.

It has been proposed previously to provide air-bags in motor vehicles such as motor cars, the air-bags being adapted to be inflated in the event that an accident should occur.

A typical air-bag is made of a fabric, such as a woven polyamide material, and the air-bag is adapted to be inflated very rapidly in response to a signal which senses an impact or an accident situation.

Typically, such air-bags are located in the steering wheel or in the dashboard to provide protection for an occupant of the vehicle in the event that a frontal impact should occur. Such air-bags are inflated relatively rapidly and commence deflation almost immediately so as to provide a soft cushion. A soft cushion tends to decelerate an occupant of a vehicle, when the occupant is thrown forwardly during a frontal impact, without injuring the occupant.

WO 01/49986

PCT/SE90/01634

2

Air-bags of the type described above are generally inflated in a period of time which is less than 50 milliseconds, and often the air-bag is substantially deflated 200 milliseconds after the impact is sensed. Consequently, air-bags of this type do not provide sustained protection, which may be desirable in the event of a roll-over accident and which may also be desirable in the event that a second impact should occur following an initial impact.

It has been proposed (see WO96/22199) to use a metal air-bag with a separate gas generator. The described metal air-bag is of a complex design and difficult to manufacture.

The present invention seeks to provide an improved air-bag arrangement.

According to this invention there is provided an air-bag, said air-bag comprising a first metal layer and a second metal layer super-imposed on the first layer, at least one of said layers being plastically deformable, the layers being provided with a peripheral seal sealing the layers together to define a substantially gas-tight chamber, there being gas generating means within the chamber and means to activate the gas generating means.

The metal may be coated with plastic or laminated in some other way.

The metal layers preferably have a very low permeability. The air-bag, when inflated, may remain inflated for a relatively long period of time, thus providing sustained protection. The use of metal may also provide the advantages of corrosion resistance and wear resistance.

Preferably the first chamber is substantially gas-tight.

WO 01/45986

PCT/JP2000/01624

3

Advantageously both of the layers are plastically deformable.

Preferably the gas generating means are retained in position by regions of the said two layers where the two layers are secured together.

Advantageously the gas generating means are retained in position in a respective chamber that communicates with the first chamber.

Conveniently the gas generating means comprise pyrotechnic means, and the means to activate the gas generating means comprise means to ignite the pyrotechnic means.

Preferably the pyrotechnic means comprise an igniter adapted to be ignited in response to an electrical signal, and an inflator adapted to be activated in response to activation of the igniter.

Advantageously the igniter comprises a pyrotechnic charge within a housing formed of a plastics material.

Conveniently the inflator comprises a pyrotechnic charge within a housing of a plastic material.

Preferably the igniter and the inflator are located in adjacent recesses defined by the said first metal layer and second metal layer, with there being a passage between the two recesses providing a communication between the recesses.

Advantageously the pyrotechnic means communicate with the rest of the chamber by one or more flow passages of a constricted size.

WD 01/45986

PCT/SE2002/02424

4

Conveniently the chamber is divided into a plurality of intercommunicating cells by a plurality of regions in which the first layer is secured to the second layer.

Preferably in the regions where the first layer is secured to the second layer, the first layer is welded to the second layer.

Advantageously the peripheral seal is constituted by a peripheral weld.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described, by way of example, with reference to the accompanying drawings.

FIGURE 1 is a plan view of an air-bag in accordance with the invention in an uninflated state;

FIGURE 2 is a part schematic view corresponding to Figure 1 of an air-bag in an uninflated state;

FIGURE 3 is a side view of the air-bag of Figures 1 and 2 in an uninflated state, and

FIGURE 4 is a schematic sectional view of the air-bag, as shown in Figures 1-3, in an inflated state.

Referring initially to Figure 1 of the accompanying drawings, a substantially square metal sheet 1 is illustrated, which is to be utilised to form part of an air-bag in accordance with the invention, with regions 2 of the sheet



WO 01/45886

PCT/JP00/02434

5

which are to be welded or otherwise secured to another corresponding sheet being shaded. The sheets may be plastic coated or laminated in some other way.

The metal sheet has a thickness such that the metal sheet is plastically deformable.

The regions 2 where the sheet is to be welded to a corresponding sheet include a peripheral region 3 surrounding substantially the whole of the exterior of the sheet, with the exception of a small region 4 located in the centre of one side of the sheet. The region 4 is slightly recessed, and is aligned with a larger recess 5 located adjacent the edge of the sheet. The recess 5 is bounded by regions 6,7 where the sheet 1 is to be welded or otherwise connected to a super-imposed sheet. The regions 6,7 are separated by a further passageway 8 which is aligned with the passageway 4 that is located on the opposite side of the recess 5. The passageway 8 leads to a further recess 9. The recess 9 is bounded by a region 10 which substantially surrounds the recess 9. The region 10 has two breaks or passages 11,12 formed therein. The passages 11,12 form a communication between the recess 9 and two cells 13,14 which are defined by a plurality of aligned regions 15 where the illustrated sheet 1 is to be connected to a super-imposed sheet. The regions 15 extend transversely across the sheet 1 in three parallel lines, with the regions 15 being separated by gaps 16. The regions 15 and the gaps 16 serve to define not only the cells 13,14 but also two additional cells 17,18, with all of the cells 13,14, 17,18 being in communication with each other through the gaps 16.

Referring now to Figure 2 of the accompanying drawings, the sheet 1 is again illustrated. An igniter 20 is shown. The igniter 20 has a plug 21 which is formed on one end of a cylindrical housing 22. The plug 21 is located within

WO 01/45986

FCT/SE06/02424

6

the passage 4 and the housing 22 is located within the recess 5. The housing 22 may be formed of a plastics material. The housing 22 contains a pyrotechnic charge. A pair of electric wires 23 are provided which extend through the plug to a squib located within the housing 22.

An inflator 24 is illustrated. The inflator 24 comprises a cylindrical housing, which may be formed of a plastics material, which contains an appropriate pyrotechnic material. An inflator 24 is located within the recess 9.

Figure 3 illustrates a complete air-bag in accordance with the invention. A second sheet 30, which is identical to the sheet 1 of Figure 1, is superimposed on top of the combination of the sheet 1, the igniter 20 and the inflator 24 as shown in Figure 2. The sheet 1 and the sheet 30 are welded or otherwise secured together in all of the shaded regions 2 as described above and with reference to Figure 1. The peripheral region 3 is secured to the plug 21 of the igniter 20 so that the peripheral region 3 forms a substantially gas-tight seal. The complete air-bag comprises a first or main chamber incorporating the cells 13, 14, 17 and 18, which is in communication with a second chamber, constituted by the recess 9, where the pyrotechnic material is retained in position by the regions of the metal sheets 1 and 30 that have been welded together.

As can be seen from Figure 3, the igniter 20 is of a lesser diameter than the inflator 24.

The air-bag, as described above, is intended to be mounted in a motor vehicle and associated with a sensor adapted to sense an accident situation. The sensor provides an electrical signal through the wires 23 to activate the igniter 20. The pyrotechnic material within the igniter 20 is thus ignited. Hot

WO 01/43386

PCT/US2000/026324

7

gas flows through the passage 8 extending between the recess 5 and the recess 9. The hot gas ignites the pyrotechnic charge within the inflator 24. The pyrotechnic charge within the inflator 24 generates hot gas which passes through the passageways 11 and 12 from the recess 9 so that gas is supplied to the cells 13 and 14, and subsequently to the cells 17 and 18.

The passageways 11 and 12 are dimensioned so that a sufficient pressure is maintained within the recess 9 during combustion of the pyrotechnic material within the inflator 24 to ensure that the combustion is completed in an effective manner.

The cells 13, 14, 17 and 18 inflate to have a substantially cylindrical form, as shown in Figure 4. As the cells inflate the sheets 1 and 30 each deform plastically. The first chamber defined by the cells 13, 14, 17 and 18 may be substantially gas-tight, and thus all of the combustion products of the pyrotechnic charges within the igniter 20 and the inflator 24 are retained within the chamber defined by the air-bag, and the heat of combustion is also retained within the air-bag, at least initially. This facilitates full inflation of the air-bag. Because the gas generating means constituted by the igniter and the inflator are contained within the chamber defined by the air-bag, there is no need to provide a separate gas generator housing, and also no need to provide a duct connecting the gas generator housing to the air-bag. However, the air-bag may be provided with a vent adapted to permit some gas to escape. The vent may be sealed, for example by a foil or plug, so that the vent may open automatically if the pressure in the air-bag exceeds a predetermined threshold.

It is envisaged that an air-bag as described above may be mounted in various alternative positions within a motor vehicle. For example, the air-bag may be mounted on a side door to provide protection in the event that a side

WO 01/45986

PCT/US2000/02634

8

impact should occur, or may be mounted beneath a dashboard to provide protection for the knees and lower legs of an occupant of a vehicle. It is envisaged that the air-bag will be inflated within a relatively short period of time, but will remain inflated for a relatively long period of time, at least when compared with the time of inflation of a prior proposed fabric bag. Since the metal is not permeable, or has a very low permeability, the gas will be retained within the bag, thus keeping the bag inflated. An air-bag as described may thus provide valuable protection in the event, for example, of a roll-over accident. Since the air-bag is of metal, and the metal is plastically deformed during inflation, the air-bag will retain its "inflated" form, even if a vent is opened and the air pressure in the air-bag is reduced to atmospheric pressure.

The use of metal may make the air-bag especially suitable for use where the bag is exposed to wear, or where the bag is in an environment where a fabric bag may deteriorate, particularly if the metal is corrosion-resistant.

In the present specification "comprise" means "includes or consists of" and "comprising" means "including or consisting of".

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

WO 01/45904

PCT/JP00/02224

9

## CLAIMS:

1. An air-bag, said air-bag comprising a first metal layer and a second metal layer super-imposed on the first layer, at least one of said layers being plastically deformable, the layers being provided with a peripheral seal sealing the layers together to define a first chamber, there being gas generating means within the chamber and means to activate the gas generating means.
2. An air-bag according to Claim 1 wherein the first chamber is substantially gas-tight.
3. An air-bag according to Claim 1 or 2 wherein both of the layers are plastically deformable.
4. An air-bag according to any one of the preceding Claims wherein the gas generating means are retained in position by regions of the said two layers where the two layers are secured together.
5. An air-bag according to Claim 4 wherein the gas generating means are retained in position in a respective chamber that communicates with the first chamber.
6. An air-bag according to any one of the preceding Claims wherein the gas generating means comprise pyrotechnic means, and the means to activate the gas generating means comprise means to ignite the pyrotechnic means.

WO 01/45786

PCT/SE2000/2524

10

7. An air-bag according to Claim 6 wherein the pyrotechnic means comprise an igniter adapted to be ignited in response to an electrical signal, and an inflator adapted to be activated in response to activation of the igniter.
8. An air-bag according to Claim 7 wherein the igniter comprises a pyrotechnic charge within a housing formed of a plastic material.
9. An air-bag according to Claim 7 or 8 wherein the inflator comprises a pyrotechnic charge within a housing of a plastic material.
10. An air-bag according to any one of Claims 7 to 9 wherein the igniter and the inflator are located in adjacent recesses defined by the said first metal layer and second metal layer, with there being a passage between the two recesses providing a communication between the recesses.
11. An air-bag according to any one of Claims 6 to 10 wherein the pyrotechnic means communicate with the first chamber by one or more flow passages of a constricted size.
12. An air-bag according to any one of the preceding Claims wherein the first chamber is divided into a plurality of inter-communicating cells by a plurality of regions in which the first layer is secured to the second layer.
13. An air-bag according to Claim 4, or any Claim dependent thereon, or Claim 12, wherein, in the regions where the first layer is secured to the second layer, the first layer is welded to the second layer.
14. An air-bag according to any one of the preceding Claims wherein the peripheral seal is constituted by a peripheral weld.

WO 01/45284

PCT/JP2000/02624

11

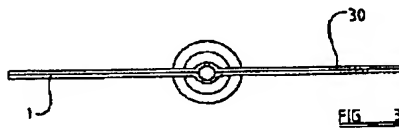
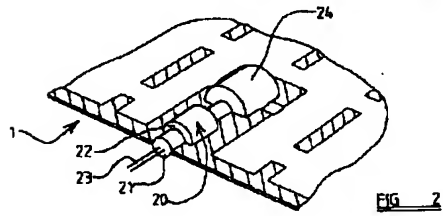
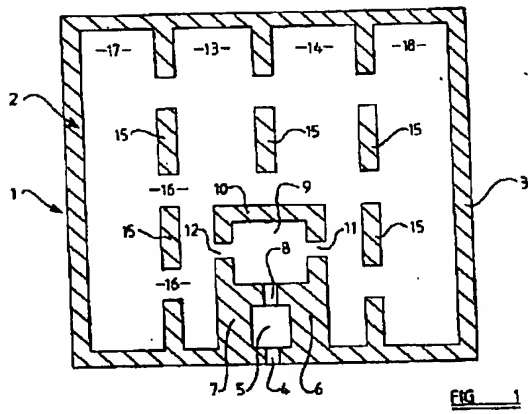
15. An air-bag substantially as herein described with reference to and as shown in the accompanying drawings.

16. Any novel feature or combination of features disclosed herein.

WO 01/45596

PCT/JP00/02404

1 / 2

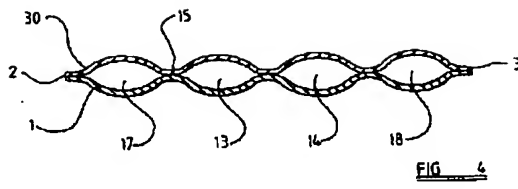




WO 01/42998

PCT/JP00/00424

2 / 2



## 【国際調査報告】

INTERNATIONAL SEARCH REPORT		International application No. PCT/SE 00/02624
<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC: B60R 21/16 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELD SEARCHED</b>		
Machines documentation searched (classification system followed by classification symbols)		
IPC: B60R		
Documentation searched other than machine documentation to the extent that such documents are included in the fields searched		
SE, DK, FI, NO classes as above		
Extensive data have been searched during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category	Character of document, with indication, where appropriate, of the relevant passages	Reference to claim No.
P, X	NO 0050270 A1 (AUTOMOTIVE DEVELOPMENT SPECIALISTS LTD), 31 August 2000 (31.08.00), page 9, line 20 - line 25; page 24, line 23 - line 29, figures 1a, 1b	1-3, 6-9, 12-16
Y	US 5868422 A (GALBRAITH ET AL), 9 February 1999 (09.02.99), column 4, line 5 - line 15, figure 2	1-3, 6-9, 12-16
Y	US 3425712 A (C. D. BERRYMAN), 4 February 1969 (04.02.69), column 5, line 65 - column 6, line 8, figure 7	1-3, 6-9, 12-16
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family trees.		
* Special categories of cited documents "A" document defining the general state of the art which is not considered to be of particular relevance "B" prior art document or patent published on or after the international filing date "L" document which may have doubt on priority date(s) or which is used to establish the publication date of an other document or other special reason (to be specified) "O" document referring to oral disclosures, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principles or theory underlying the invention "X" document of particular relevance: the stated invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the stated invention cannot be considered to involve an inventive step when the document is considered with one or more other cited documents, such combination being obvious to a person skilled in the art "Z" document mentioned in the same patent family		
Date of the actual completion of the international search		Date of writing of the international search report
27 March 2001		30-03-2001
Name and mailing address of the ISA/ Swedish Patent Office Box 5053, S-102 42 STOCKHOLM Facsimile No. +46 8 666 03 88		Authorized officer Hans Nordström/js Telephone No. +46 8 782 35 00

Form PCT/ISA(29) second sheet (July 1998)

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/SE 00/02624

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of documents, with indications, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 5839754 A (SCHENCK ET AL.), 24 November 1998 (24.11.98)	1-16
A	DE 3934588 A1 (AUDI AG), 25 April 1991 (25.04.91)	1-16
A	GB 2297950 A (AUTOLIV DEVELOPMENT AB), 21 August 1996 (21.08.96)	12

Form PCT/ISA/210 (continuation of sheet 01/01/1999)

INTERNATIONAL SEARCH REPORT				International application No.	
Information on patent family members				PCT/SE 00/02624	
Patent document cited in search report		Publication date	Patent family member(s)	Publication date	
WO	0050270	A1	31/08/00	AU 1869800 A	01/08/00
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US	5839766	A	24/11/98	NONE	
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Form PCT/ISA/210 (patent family annex) (July 1999)